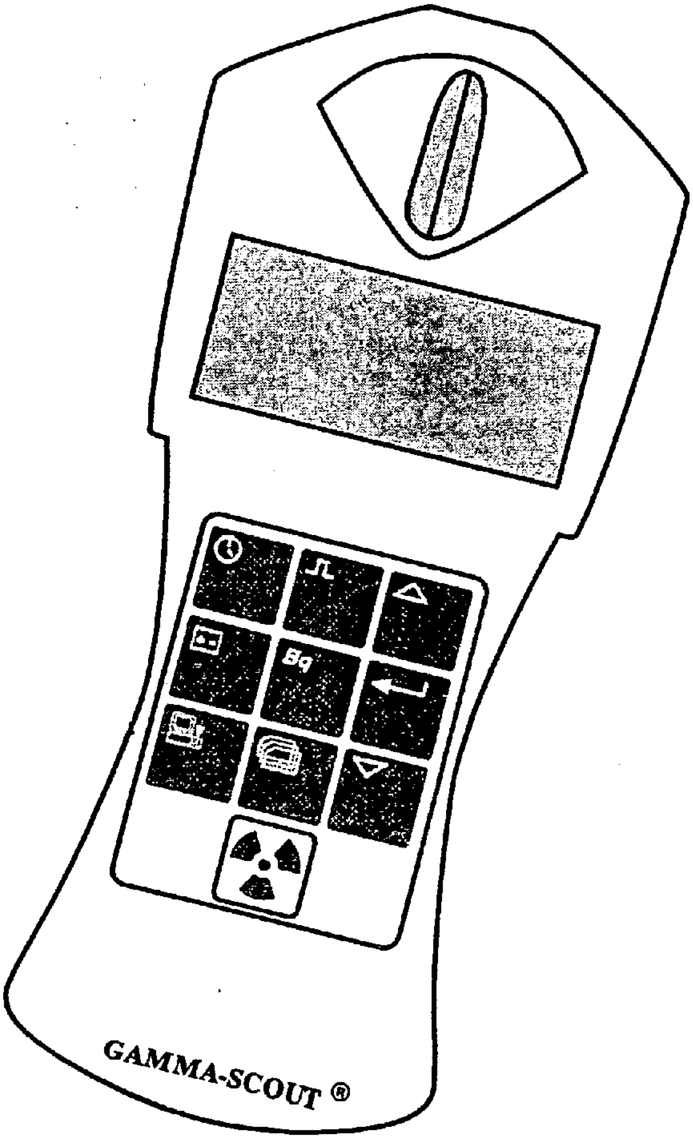
GAMMA-SCOUT®

User manual



GAMMA-SCOUT®

...measures radioactivity reliably!

CE

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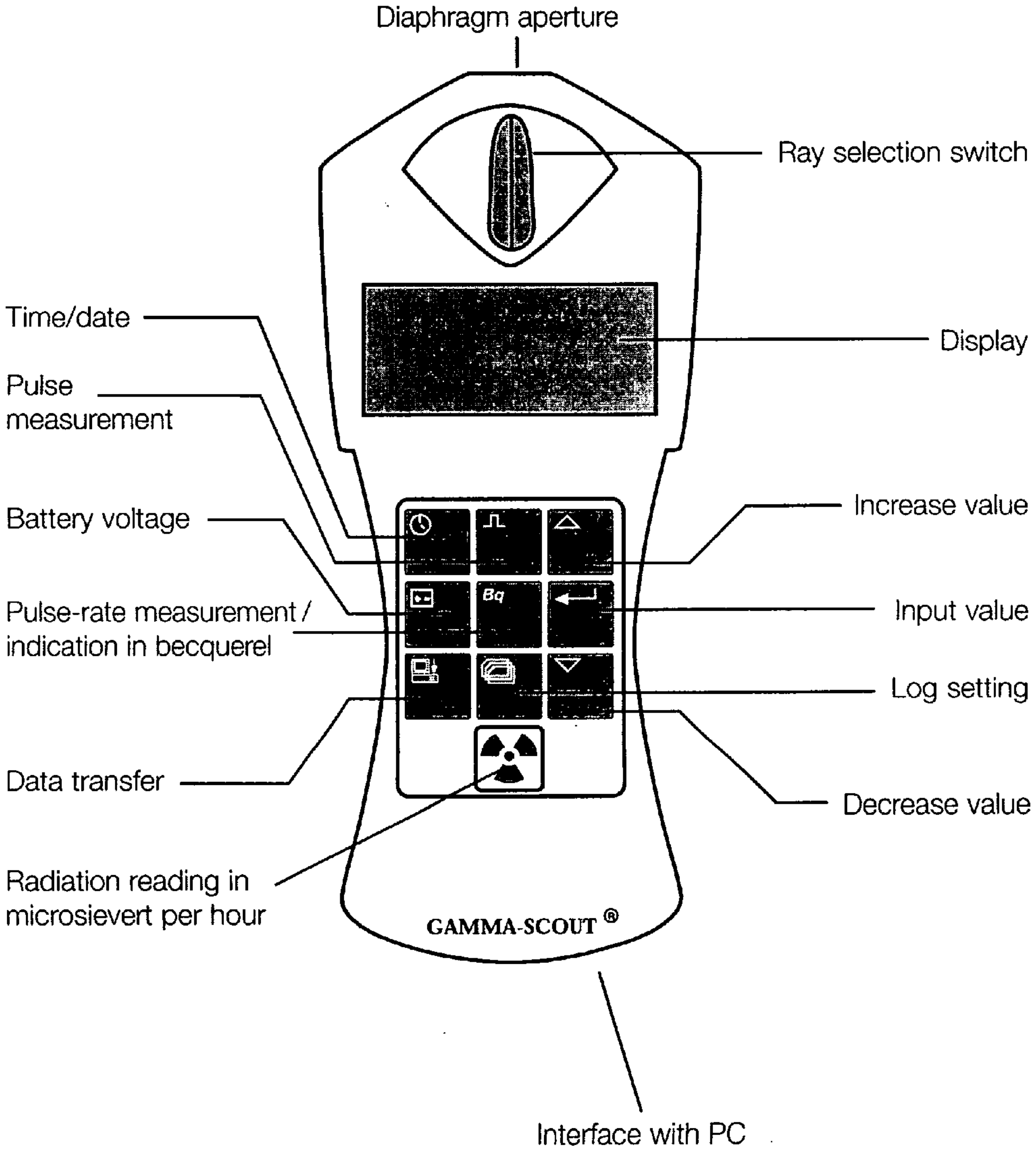
Introduction

Congratulations on having bought a GAMMA-SCOUT®! GAMMA-SCOUT® has set new standards in its class of actinometers. It is very easy to operate and offers a range of outstanding features:

- **Measuring by pushbutton:** one push of a button is enough to start radiation measuring and get a significant value at once.
- **Tested precision instrument:** Each GAMMA-SCOUT® actinometer is subjected to an endurance test supervised by the institute of radiation protection of a government-controlled technical college. Each unit receives a test certificate whose test number is identical to the unit number.
- **All ray types:** In contrast to normal actinometers, GAMMA-SCOUT® can reliably measure not only gamma rays but alpha and beta rays as well.
- **Permanent operation:** GAMMA-SCOUT® monitors radiation around the clock. Switch-on/-off is unnecessary, as is battery change.
- **Low power consumption:** Due to its supermodern electronic system, GAMMA-SCOUT® consumes very little power. This is why its battery will last up to ten years.
- **Large area of display:** All values and settings are indicated on an extra-large display.
- **Menu control:** An easy-to-understand menu guides you through all device functions.
- **Data storage:** GAMMA-SCOUT®stores all registered pulses in its internal memory, and keeps them ready for you to use when desired.
- **Evaluation by computer:** The software which comes with the GAMMA-SCOUT® enables you to evaluate the measuring data with a computer.
- **Compact design:** GAMMA-SCOUT® is very compact in its dimensions, and small enough to fit a pocket.
- **Certification:** GAMMA-SCOUT® has been tested by TÜV (German Technical Control Board) for device safety. It meets all European CE standards as well as the FCC 15 standard of the USA. GAMMA-SCOUT® emits no radiation of its own, and may be carried on aircraft.

Control panel

Your GAMMA-SCOUT® is equipped with an easy-overview control panel. It lets you set all device functions with just a few button operations.



Ray selection switch

Your GAMMA-SCOUT® is equipped with a high-precision Geiger-Müller counter tube enabling you to detect not only gamma rays but alpha and beta rays as well.

With the ray selection switch, you can choose which of these three ray types you want to measure:

- Set the selection to centre position (γ symbol) if you want to determine gamma rays only. With the switch in this position, an aluminium plate screens the counter tube window against alpha and beta rays.
- Turn the switch to the left, i.e. counterclockwise (to the β+γ symbols) if you want to measure gamma and beta rays but no alpha rays. Now, an aluminium foil screens the counter tube window against alpha rays.
- Turn the switch to the right, i.e. clockwise (to the α+β+γ symbols) if you wish to measure all three ray types. This switch position opens the counter tube window for access by the three types of ray.

For normal measuring, have the ray selection switch at centre position. Alpha and beta rays are limited in range to a few centimetres or metres, and can therefore be detected only very close to the radiation source.

This also explains why it makes little sense to keep the ray selection switch constantly open – an added reason being that the counter tube window might be destroyed in this position, as by a push with a pencil.

Radiation measurement

In standard mode, GAMMA-SCOUT® informs you quickly and reliably about the radiation exposure at the moment.

Indicating the present radiation

- Pressing the ☢ button puts GAMMA-SCOUT® into standard mode, and its display shows you the present radiation in microsievert per hour – not only as a value but also in the form of a bar chart. Note that for a small radiation value, this bar chart appears only as a single line.

Indicating the average radiation over the last day

- Pressing the ☢ button a second time causes the average radiation over the last day to be displayed for a few seconds, again in microsievert per hour. The T symbol in the display will blink. Note that this function is not available for up to 48 hours after first putting the device into operation.

What does a "microsievert" mean?

In physics, three types of radioactive rays are known: alpha, beta and gamma rays. They differ not only in their physical characteristics but also in their effects on humans.

To make these three ray types comparable in their effects on humans, a value has been created which defines the biological effects of rays: it is referred to as dose equivalent rate whose unit is the sievert.

Based on the counted radiation pulses, the different components of a radiation mix are converted into a common measure for the biological effect. In this a "standard mix" is used: cobalt 60. Conversion into the dose equivalent refers to the gamma quantum of the cobalt 60 radionuclide with a quantum energy of approx. 1.2 MeV (megaelectron volt).

Pulse counting

GAMMA-SCOUT® can also be used as a normal Geiger counter, in which case it simply counts the number of pulses received without converting them into the sievert unit. This function is always of advantage if the measuring values are to be integrated into existing processes and procedures or if the measuring process itself is to be demontrated or checked.

GAMMA-SCOUT® stores the received pulses in its internal memory.

Switching on the pulse count

- Press the ⎍ button to switch GAMMA-SCOUT® to the pulse count mode. The display then shows the pulse symbol.
  - Press the ⊟ button if you want to set a measuring time:
    - For the measuring time to count in seconds, press the ⊟ button once.
    - For the measuring time to count in minutes, press the ⊟ button twice.
    - For measuring time to count in hours, press the ⊟ button three times.
  - Now set the exact value of the desired measuring time, using the △ and ▽ button.
- Start measuring by pressing the ⎍ button a second time. The pulse symbol flashes in the display during the measuring time. The pulse readings are in units of thousands, in other words, 10 pulses are shown as value 0.010.
- If a measuring time was set, the pulse symbol flashes until the end of the measuring time, after which it is steady again. The display now shows the number of pulses counted.
- You can stop measuring in two ways:
  - by pressing the ⎍ button once again. The measuring result remains visible in the display;
  - by choosing another mode of operation. This makes the measuring result disappear.

Pulse rate measuring

In the pulse rate measuring mode, the pulses registered by the counting tube are continuously measured and converted into a pulse rate. The unit of this pulse rate is the becquerel, and one becquerel is one pulse per second.

Indicating the pulse rate

Press the Bq button to switch to the pulse rate measuring mode. The # symbol will flash for the duration of measuring. After measuring, the # symbol is steady again.

Pulse rate measuring gives the average number of pulses per second. Since radiation intensity may strongly fluctuate on a short-term basis, this indication of average rate will of course be the more exact the longer the measuring is done.
GAMMA-SCOUT® gives you a first result within a few seconds, then automatically prolongs the measuring time up to 4096 seconds in order to produce as exact an average value as possible.

Time and date

GAMMA-SCOUT® has an integrated quartz clock whose display you can activate by pushbutton. Time and date are used to register the measured radiation. Therefore, the use of world time (UTC) is preferable because no switch between summer time and winter time is necessary.

Indicating time and date

- Press the 🕒 button to call the time. The display shows the time according to clock setting plus the 🕒 symbol.

- Press the 🕒 button a second time to call the date. The display shows the date according to setting plus the 📅 symbol.

Setting the time

- First, call the time by pressing the 🕒 button. Then press the ⊟ button to set the hours. Both hour digits flash in the display. With the ⏶ and ⏷ buttons, set the hours forwards/backwards as desired. Confirm the set value with the ⊟ button.

- Press the ⊟ button a second time to set the minutes. Both minute digits flash in the display. With the ⏶ and ⏷ buttons, set the minutes forwards/backwards as desired. Confirm the set value with the ⊟ button.

- If you wish to set the seconds as well, press the ⊟ button a third time. The display shows the two minute digits together with the flashing digits for the seconds. With the ⏶ and ⏷ buttons, set the seconds forwards/backwards as desired. Confirm the set value with the ⊟ button.

You can stop the setting of the clock at any time by pressing the 🕒 button.

Setting the date

- Press the 🕒 button twice to call the date display. See description "setting the time".

You can stop the date setting at any time by pressing the 🕒 button. For stopping the year setting, press the ⊟ button a fourth time.

Battery voltage display

GAMMA-SCOUT® is powered by a Lithium/Thionyl chloride cell of 2.7-3.7 voltage.

The device will keep functioning until the cell voltage is down to 2.7. When the voltage drops below this value, the battery symbol will appear in the display. the stored data should then be read from the internal memory. Nevertheless, the data will be retained even at total breakdown of voltage, and can then be read when the device is serviced.

Indicating the battery voltage

Press the ⊡ button to have the existing battery voltage indicated. The display will show the cell voltage available when the electronic system is under maximum load.

Log setting

GAMMA-SCOUT® automatically logs the number of pulses measured, and stores these data in its internal memory. These data can be read by a computer, and processed by it.

The logging process is factory-set so that GAMMA-SCOUT® will accumulate the pulses each week, storing them as weekly values. On this basis, the capacity of the memory is sufficient to log the weekly values over a period of 10 years.

As the following table shows, you can also set shorter logging intervals, with corresponding reductions in the storage capacity:

Logging interval	**Display**	**Storage capacity**
1 week	7d	Approx. 10 years
1 day	1d	Approx. two years
1 hour	1h	Four weeks
10 minutes	10 min	Approx. four days
1 minute	1 min	Ten hours

Setting the log

- Press the ▤ button to switch to log mode. The display shows the log symbol. Briefly, the bar chart will appear in addition, indicating how much log memory is still available.
- By pressing the △ button, you select more frequent logging and, consequently, shorter logging intervals.
- By pressing the ▽ button, you select less frequent logging and, consequently, longer logging intervals.
- By pressing the ⏎ button, you enter the finally selected value of logging interval.

GAMMA-SCOUT® automatically prolongs the logging interval to a week as soon as the memory capacity is more than 3/4 full.
You can transfer the logged data to a computer at any time, and then clear the memory of your GAMMA-SCOUT® for fresh use. The next section gives you detailed information on this.

Data transfer and evaluation

In the data transfer mode, you can transfer the data which GAMMA-SCOUT® has logged in its memory to a computer for further processing. After transferring the data, you can clear the log memory and thus make it free to receive new data.

Data transfer with WINDOWS 95 or WINDOWS NT

To enable you to evaluate the logged data on a PC, the system must meet the following requirements:

- Processor: Pentium 90 and up
- RAM: 16 MB minimum
- Minimum 20 MB free hard-disk memory
- A free COM interface (on the back of your PC)

Installing the converting program

Installing the evaluation program is done according to the usual procedure with Windows 95 or Windows NT:

- Start WINDOWS 95 or WINDOWS NT.
- In menu "Start", click "Settings" and, there, "System control".
- Double-click the "Software" icon.
- Click "Install".
- Now insert the enclosed CD into the CD ROM drive, and click "Continue".
- Click "Browse".
- In the window opening now, click "(C:)" and "Gamma-V1-50CD" and, finally, "Open".
- Now you will be asked if you want to load the German or the English program version. Click "English".
- The "Setup" icon appears. Click it, then click "Open".
- In the window now opening, click "Complete".

- The Gamma program is now automatically installed, while a bar diagram shows you the progress being made. When the installation has been completed, the message "Gamma setup successfully completed" appears.
- The gamma program is now located in the "Start" menu, under "Program", and can be opened there with a double-click.

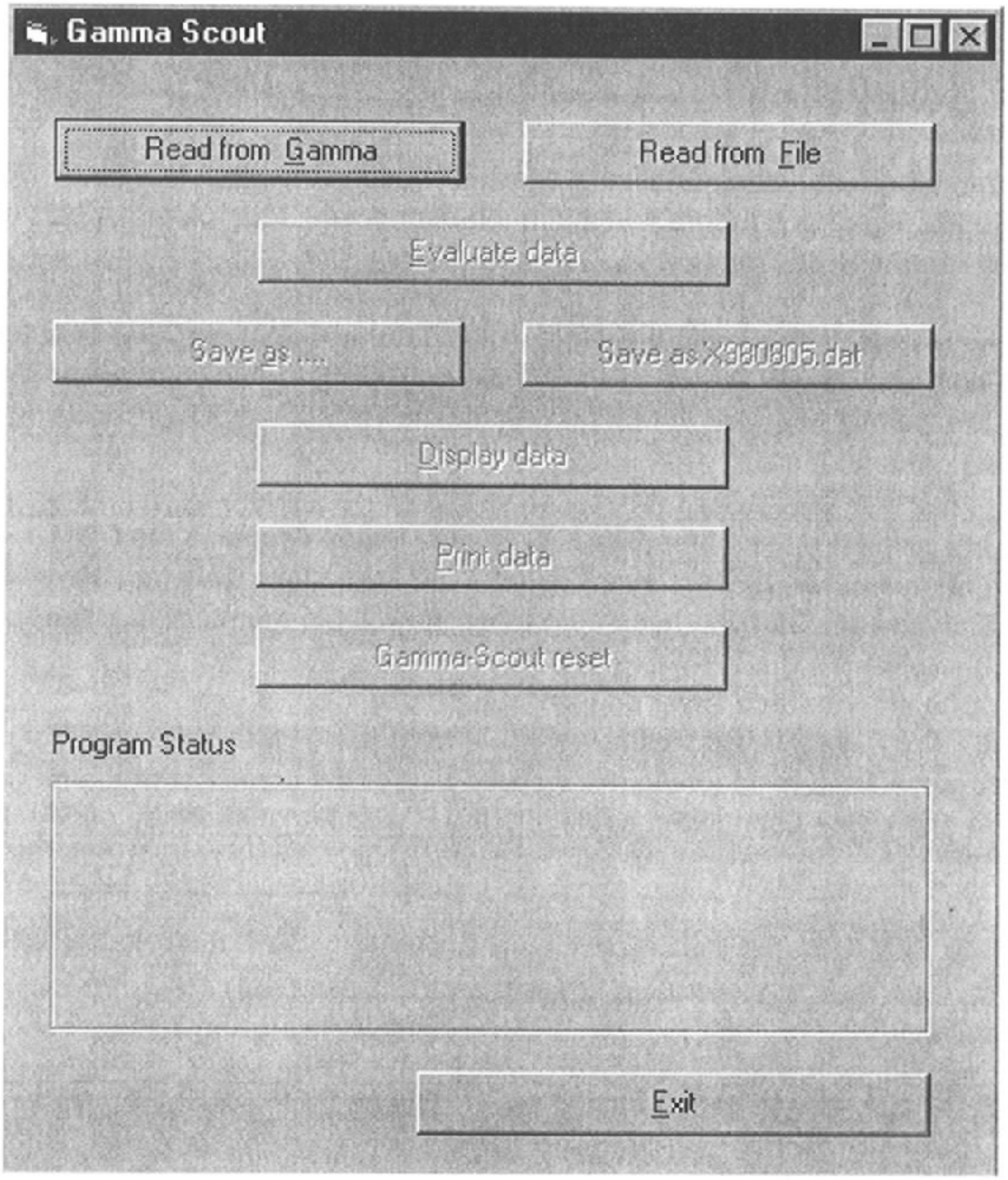
Connecting GAMMA-SCOUT® to the computer

Make sure you are not electrostatically charged when you connect GAMMA-SCOUT® to a computer. Therefore, before you make the connection, touch a metal part of the computer to remove any charge.

- Plug the enclosed cable into the 9-pole COM interface socket (COM 1) at the back of the computer. If you are using a PS 2 mouse (recognizable by its small round plug), the COM 1 interface is free for connecting GAMMA-SCOUT®, and you can plug the cable in there.
- If you are using a mouse other than PS 2, this already occupies the COM 1. In this case, the cable must be connected to the COM 2 interface. This may have 25 pole pins, which means that you need a commonly available adapter (25 holes to 9 pins).
- Next, open the interface cover on GAMMA-SCOUT®.
- Discharge yourself by touching the metallic part of the computer plug and now plug the free end of the connecting cable into the 9-pole serial interface of GAMMA-SCOUT®.

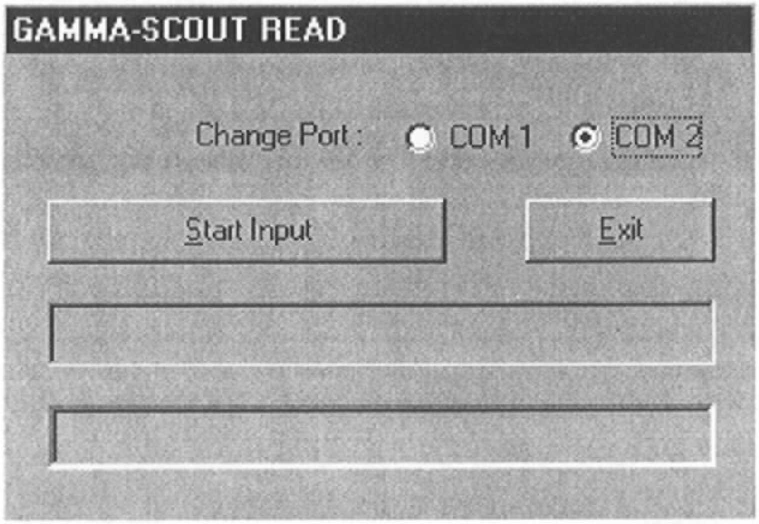
Transferring data

In the "Start" menu of the computer, select "Programm" and start the GAMMA program with a double-click. The following standard windows will appear:



- Choose "Read from file" to call data previously stored. For more information on this, refer to page 46: "Calling stored data".

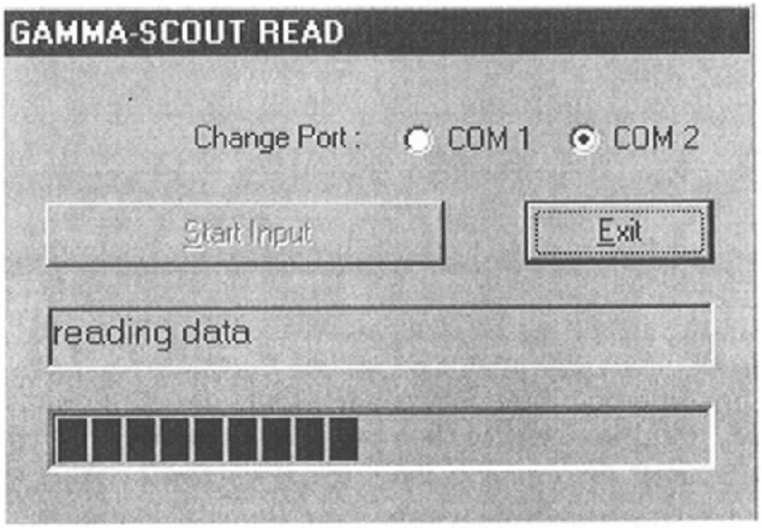
- Choose "Read from Gamma" to input data from GAMMA-SCOUT®. In the resultant window, specify the computer's interface by which you have connected GAMMA-SCOUT® (see above: "Connecting GAMMA-SCOUT® to the computer"). Click that interface.



Change Port : ○ COM 1 ● COM 2

- On GAMMA-SCOUT®, press the ▣ button to switch to the data transfer mode. Should you fail to do this, you get the message: "Port time out" and the process stops.

- On the computer screen, click "Start input". The data are read from the GAMMA-SCOUT® memory, and transferred to the computer memory as an ASCII text file named XYYMMDD.txt, with "YY" standing for the year, "MM" for the month, and "DD" for the day of input.

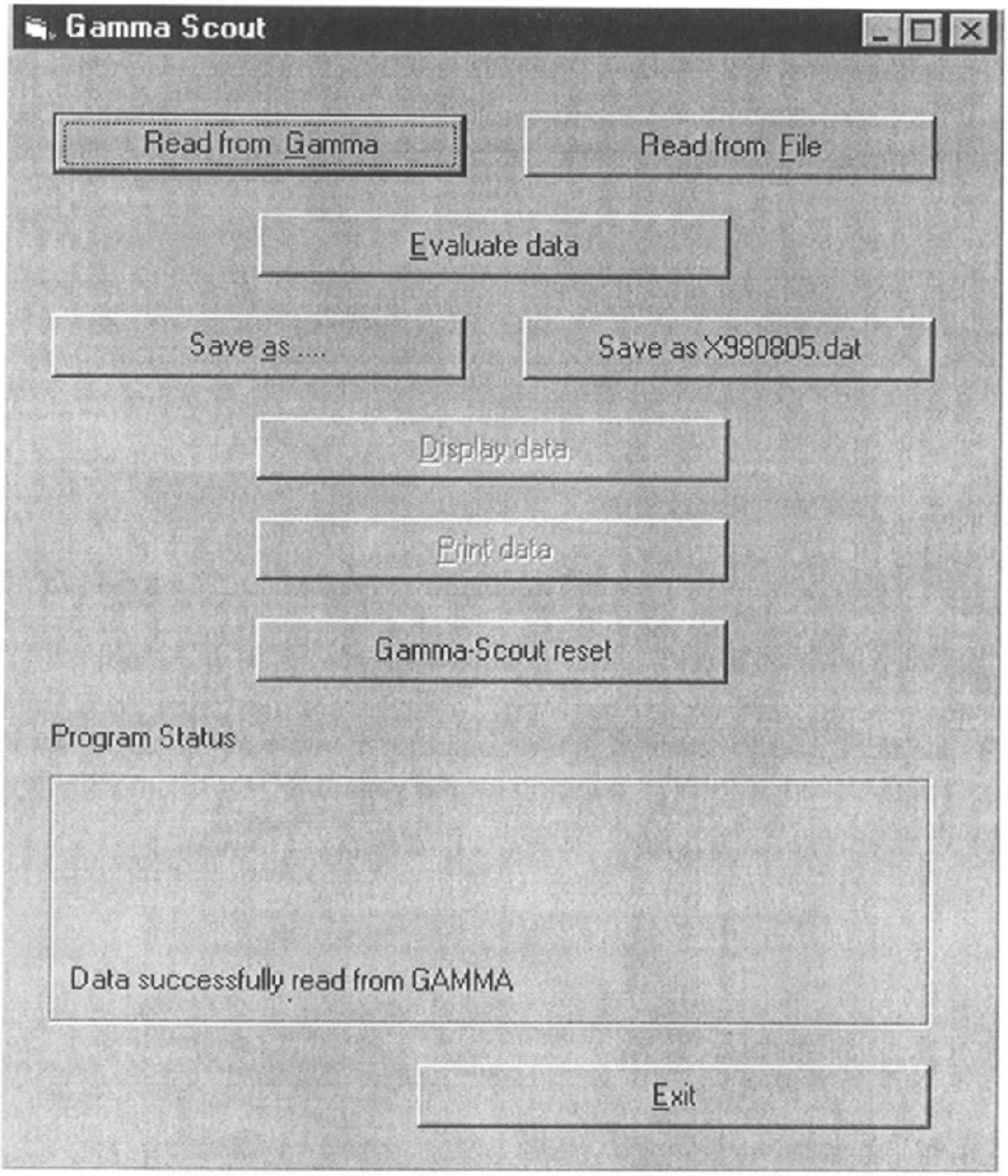


Change Port : ○ COM 1 ● COM 2

reading data

- The start window of the evaluation program appears again, with the additionally activated buttons for "Evaluate data", "Save", "Save as ..." and "GAMMA-SCOUT® reset".

In transfer mode, there is no high voltage on the sensor. Consequently, radiation measurement does not take place during a data transfer. This is why you should now select "Reset GAMMA-SCOUT® and then end the data-transfer mode by selecting a different mode (see page 48).



Data successfully read from GAMMA

Storing data

- Click "Save" if you want to save the data on your computer's hard disk as a file named "XYYMMDD.dat". After saving, the original window appears again, but now with the message "Data successfully read from Gamma" in the status field.

- If you want to save the data on your computer's hard disk as a file with a name of your choice, click "Save as...".

Note: If you read data from GAMMA-SCOUT® more than once a day, you have to name each of the files differently to avoid overwriting the XYYMMDD.dat file.

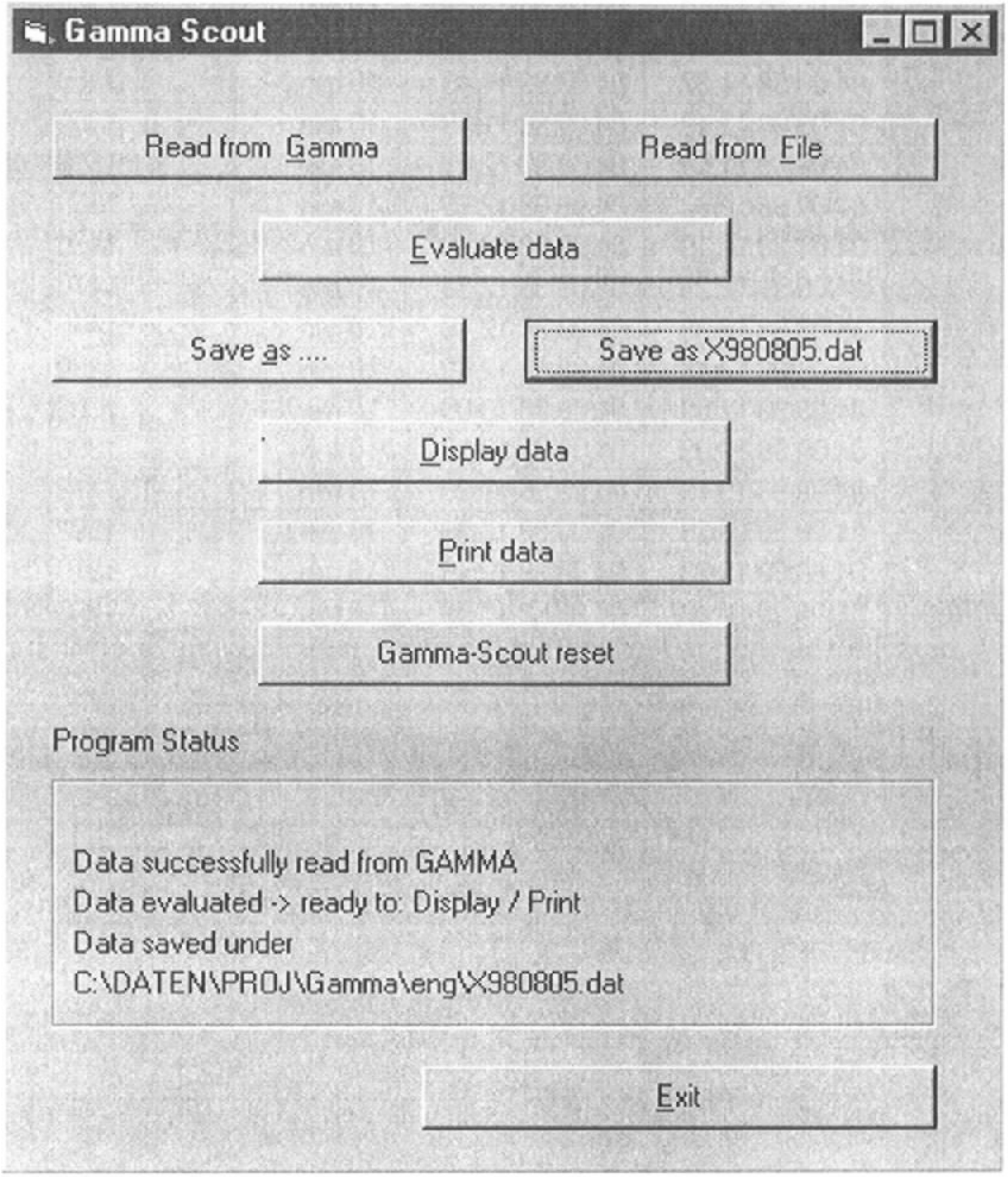
Calling stored data

Click "Read from file" to open a file already stored on the hard disk. The standard routine opens the common window for searching files, from which you can choose the file to be opened.

Evaluating the data

When you have transferred data from GAMMA-SCOUT® to the computer, or opened an existing file, you get the start window again.

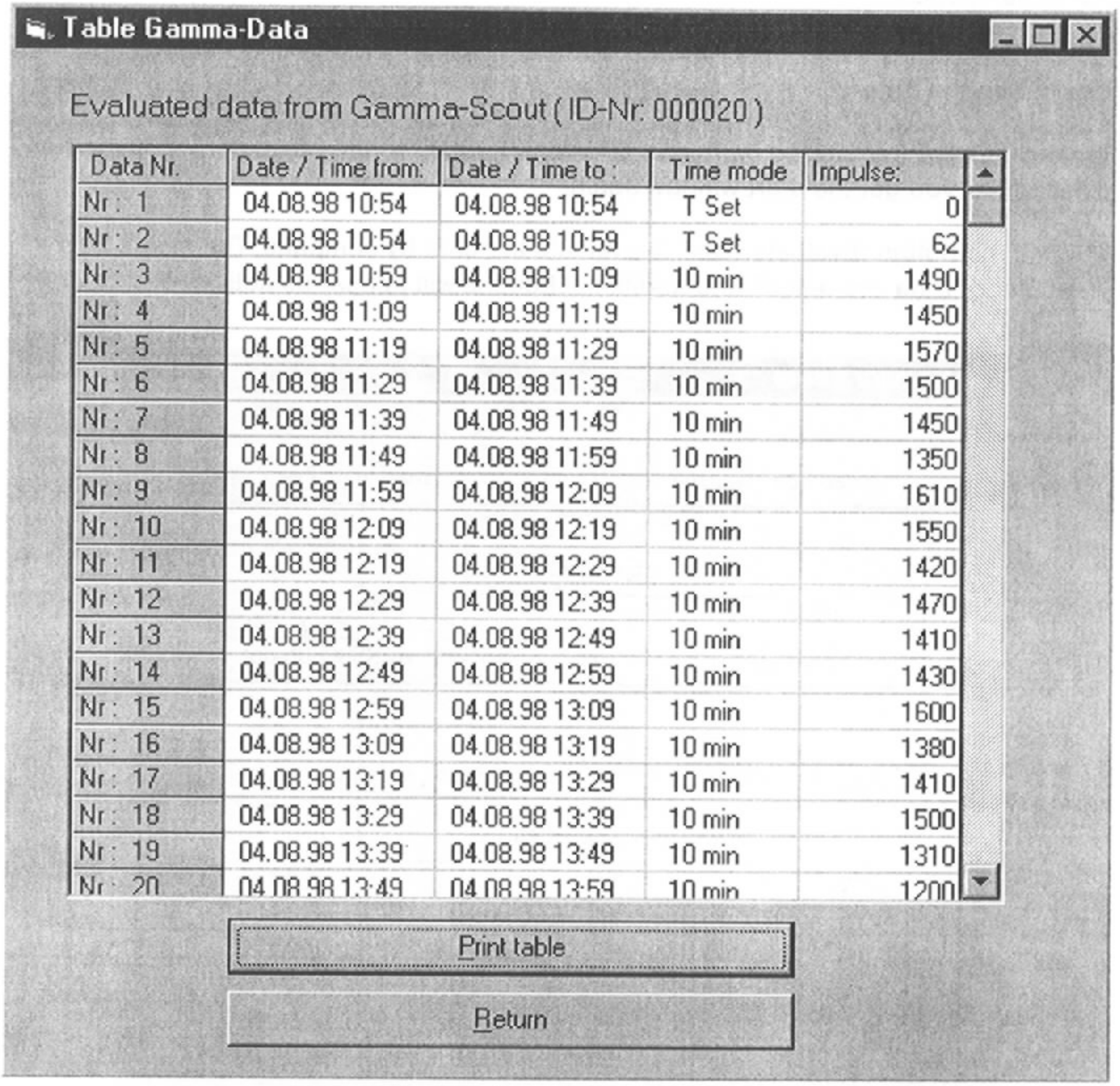
- Click the button "Evaluate data" to evaluate the data by computer. The status field will read "Data evaluated", and additional buttons will appear as activated.



```
Data successfully read from GAMMA
Data evaluated -> ready to: Display / Print
Data saved under
C:\DATEN\PROJ\Gamma\eng\X980805.dat
```

Displaying data

- Click “Display data” to have the data displayed as depicted below:



Evaluated data from Gamma-Scout (ID-Nr: 000020)

Data Nr.	Date / Time from:	Date / Time to :	Time mode	Impulse:
Nr : 1	04.08.98 10:54	04.08.98 10:54	T Set	0
Nr : 2	04.08.98 10:54	04.08.98 10:59	T Set	62
Nr : 3	04.08.98 10:59	04.08.98 11:09	10 min	1490
Nr : 4	04.08.98 11:09	04.08.98 11:19	10 min	1450
Nr : 5	04.08.98 11:19	04.08.98 11:29	10 min	1570
Nr : 6	04.08.98 11:29	04.08.98 11:39	10 min	1500
Nr : 7	04.08.98 11:39	04.08.98 11:49	10 min	1450
Nr : 8	04.08.98 11:49	04.08.98 11:59	10 min	1350
Nr : 9	04.08.98 11:59	04.08.98 12:09	10 min	1610
Nr : 10	04.08.98 12:09	04.08.98 12:19	10 min	1550
Nr : 11	04.08.98 12:19	04.08.98 12:29	10 min	1420
Nr : 12	04.08.98 12:29	04.08.98 12:39	10 min	1470
Nr : 13	04.08.98 12:39	04.08.98 12:49	10 min	1410
Nr : 14	04.08.98 12:49	04.08.98 12:59	10 min	1430
Nr : 15	04.08.98 12:59	04.08.98 13:09	10 min	1600
Nr : 16	04.08.98 13:09	04.08.98 13:19	10 min	1380
Nr : 17	04.08.98 13:19	04.08.98 13:29	10 min	1410
Nr : 18	04.08.98 13:29	04.08.98 13:39	10 min	1500
Nr : 19	04.08.98 13:39	04.08.98 13:49	10 min	1310
Nr : 20	04.08.98 13:49	04.08.98 13:59	10 min	1200

- Stored day data can be called again and processed further via the "Display data" command.

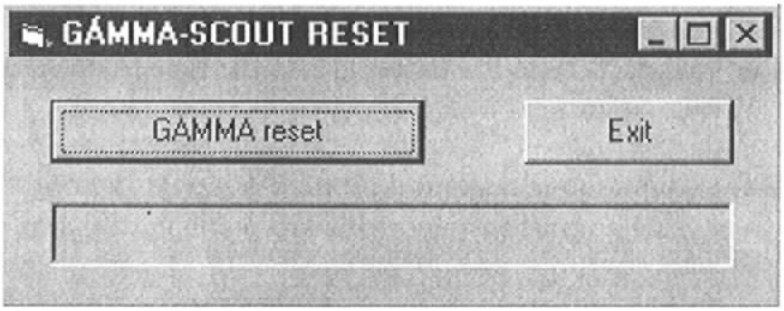
Data print-out

Click "Print data" for outputting the data on a printer. Should the page makeup be incorrect, please adjust the setting of your printer accordingly.

Clearing the memory

You can clear the GAMMA-SCOUT® memory and thus have its full capacity available for storing new data. To prevent unintentional erasure, however, memory clearing is possible only after read-out. Occasional read-out is advisable in any case because GAMMA-SCOUT® will start overwriting old data as soon as its internal memory is full.

- With the "GAMMA-SCOUT® reset" command, you can erase the GAMMA-SCOUT® memory. The following verification request will appear as a safety measure:



- Here again, click "GAMMA reset" to clear the GAMMA-SCOUT® memory. For this, however, GAMMA-SCOUT® must still be in the data transfer mode.

- The status field will now show the message "GAMMA has been reset".

- Return GAMMA-SCOUT® to measuring status by selecting a mode like ☢. Build-up of the sensor voltage takes about 1 minute; this time is required before correct values are displayed. (During the transfer mode, no pulses are collected. Therefore, time of transfer mode should be kept short. See page 44).

Data transfer with other operating systems

- Open the cover of the interface socket on your GAMMA-SCOUT®. Use the enclosed cable for connecting GAMMA-SCOUT®'s 9-pole serial interface with the serial interface of the computer.

- Set the data transfer of the computer to the following values:
  - Transmission rate: 2400 baud
  - Data word width: 7 bits
  - Parity: even
  - One stop bit
  - Without protocol

  Data transmission is carried out in half-duplex operation.

- Select a terminal program on your computer.

- Press the 🖳 button to switch to data transfer mode.

- On the computer keyboard, type the letter "b" to have the contents of the GAMMA-SCOUT® log memory transferred to the computer.

- On the computer keyboard, type the letter "z" to clear the GAMMA-SCOUT® log memory.

- End the data-transfer mode by selecting a different mode.

Technical data

Display	Liquid-crystal display (LCD), 4-digit, numeric with dimension, quasi-analog logarithmic bar chart Operating-mode indicators	
Ray detector	End-window alpha-beta-gamma detector counting tube according to the Geiger-Müller principle Stainless-steel housing with neon halogen filling Measuring length 38.1 mm, measuring diameter 9.1 mm Mica window 1.5 to 2 mg/cm^2 Gamma sensitivity 108 pulses at Co 60 radiation of 1μSv/h in energy band of ambient radiation Zero ratee <10 pulses per minute with screening by 3 mm Al and 50mm Pb Operating temperature -40 to +75°C, operating voltage approx. 450 V	
Ray types	α alpha)	From 4 MeV
	β (beta)	From 0.2 MeV
	γ (gamma)	From 0.02 MeV
Ray selection	α+β+γ	Without screen
	β+γ	Al foil, approx. 0.1 mm schirmt α voll ab
	γ	Al screen, approx. 3 mm Screens off α completely and β to 2 MeV, weakens γ less than 7%
Life	Aprrox. 10 years	At 20°C and natural environmental load
Power consumption	On average, less than 10 microamperes	
Memory	2 Kbyte	
Housing	impact-resistant Novodur plastic	
Dimensions	Length 163 mm x width 72 mm x height 30 mm	
Interference protection	European CE standard, US standard FCC 15	
Servicing	Distributor EURAMI GROUP INC. P.O. Box 15578 Scottsdale, AZ 85267 USA Phone:(480)699-3205 Fax:(480)699-3215 E-Mail: euramigroup@earthlink.net Internet: www.gammascout.com	
Date	30 July 1998 (Right of modification reserved)	

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